

Honors Algebra 2 A Final Exam Review

Evaluate

1. $\log_3 81$

1. $\underline{4}$

2. $\log_9 3$

2. $\underline{\frac{1}{2}}$

3. $\log_6 1$

3. $\underline{0}$

4. $5^{\log_5 4}$

4. $\underline{4}$

5. $\log 10$

5. $\underline{1}$

6. $\ln e^8$

6. $\underline{8}$

7. $\log \log 10^{10}$

7. $\underline{1}$

8. $e^{\ln 5}$

8. $\underline{5}$

Solve each equation

9. $2 \ln(x+3) - \ln(x+1) = 3 \ln 2$

$x = 1$ ~~scribbled out~~

10. $e^{\ln(x+1)} = 3$

$x+1=3$
 $x=2$

11. $xe^x + e^x = 0$

$x = -1$

12. $\log_2(x+4) = \log_2(3x+7)$

$x = -\frac{3}{2}$

13. $\log_3(x+3) + \log_3(x+5) = 1$

$x = -2, -8$

14. $\ln(-4-x) + \ln 3 = \ln(2-x)$

$x = -7$

18. $\log_{x^2+6} 2 + \log_{x^2+6} 5 = 1$

$x = \pm 2$

19. $5^{x^2} \cdot 5^{-9x} = 5^{-18}$

$x = 6, 3$

Solve using the Quadratic Formula. Domain = {Complex numbers}

21. $6x^2 - x = 2$

$x = \frac{-1}{2}, \frac{2}{3}$

22. $2x^2 - 3x - 4 = 0$

$x = \frac{3 \pm \sqrt{41}}{4}$

23. $\frac{x+1}{3x+x} = \frac{x-2}{2x-3}$

$x = -3, \frac{1}{2}$

24. $\frac{1}{7}x^2 + 1 = \frac{4}{7}x$

$x = 2 \pm i\sqrt{3}$

Solve by Completing the Square. Domain = {Complex numbers}

25. $x^2 + 6x + 7 = 0$ $x = -3 \pm \sqrt{2}$

26. $x^2 - 8x + 11 = 0$ $x = 4 \pm \sqrt{5}$

27. $4x^2 - 12x - 11 = 0$ $x = \frac{3}{2} \pm \sqrt{5}$

Simplify

28. $\frac{x^3 + 2x^2 + 4x}{x^3 - 8}$ $\frac{x}{x-2}$

29. $\frac{2ab + 2by + 3a + 3y}{2b^2 - 7b - 15}$ $\frac{a+y}{b-5}$

30. $\sqrt{\frac{a^4 b}{27b^2}}$ $\frac{a \sqrt[4]{3a^3 b^3}}{3b}$

31. $\frac{2x^4 - 32}{4x - 8}$ $\frac{(x+2)(x^2+4)}{2}$

32. $\frac{\frac{4}{x+y} - \frac{4}{x}}{y}$ $\frac{-4}{x(x+y)}$

33. $\frac{3 + \sqrt{2}}{1 - \sqrt{6}}$ $\frac{3 + 3\sqrt{6} + \sqrt{2} + 2\sqrt{3}}{-5}$

34. $\frac{x^2 - 36}{x^2 - 15x - 54}$ $\frac{(x-6)(x+6)}{(x+3)(x-18)}$

35. $\frac{8x^3 - 125}{1 + x^3} \div \frac{4x^2 - 25}{x^2 + 13x + 12}$ $\frac{(4x^2 - 10x + 25)(x+12)}{(x^2 + x + 1)(2x+5)}$

Factor Completely

36. $9x^2 + 30xy + 16y^2$ $(3x+2y)(3x+8y)$ 37. $35x^2 - 7x - 24$ ALREADY FACTORED

38. $125x^3 - 64$ $(5x-4)(25x^2 + 20x + 16)$ 39. $8x^3 + 27$ $(2x+3)(4x^2 - 6x + 9)$

40. $4x^2 + 9$ ALREADY FACTORED

Expand each binomial.

41. $(2x + y)^3$ $8x^3 + 12x^2y + 6xy^2 + y^3$

42. $(5x - 2y)^3$ $125x^3 - 150x^2y + 60xy^2 - 8y^3$

43. $(8x - 1)^3$ $512x^3 - 192x^2 + 24x - 1$

44. $(3x + 5y)^3$ $27x^3 + 135x^2y + 225xy^2 + 125y^3$

45. The sum of the squares of three consecutive integers equals 50. What are the integers?

3, 4, 5 -3, -4, -5

Add or subtract.

46. $\frac{3x}{x-9} + \frac{2x+1}{x+9} - \frac{4}{x^2-81}$

~~$\frac{5x^2+10x-13}{x^2-81}$~~

$\frac{5x^2+10x-13}{x^2-81}$

47. $\frac{x-1}{x-3} - \frac{x+2}{x+1} + \frac{5}{x}$

$\frac{6x^2-5x-15}{x(x+1)(x-3)}$

Find the zeros of f(x).

48. $f(x) = x^4 + 3x^3 - 30x^2 - 6x + 56$

$x = 4, -7, \pm\sqrt{2}$

49. $f(x) = 12x^3 + 8x^2 - 3x - 2$

$x = \frac{1}{2}, -\frac{1}{2}, -\frac{2}{3}$

50. A polynomial with real coefficients and leading coefficient 1 has the given zeros and degree. Express as a product of linear and quadratic factors that are irreducible over the real numbers.

Zeros: 0, -2i, 1 - i

Degree: 5

$x^5 - 2x^4 + 6x^3 - 8x^2 + 8x$

51. Find a polynomial of degree 7, such that -2 and 2 are both zeros of multiplicity 2, 0 is a zero of multiplicity 3 and $f(-1) = 27$.

~~$(x^7 - 8x^5 + 16x^3)$~~

$(-3(x^7 - 8x^5 + 16x^3))$

52. A rectangular dog run is constructed with 48 m of fencing. The area of the dog run is 63 m².

What are the dimensions of the dog run?

3 m x 21 m

Solve all problems algebraically.

53. Given $A(-1, 6)$, find the coordinates of the point B such that $M(10, -3)$ is the midpoint of \overline{AB} .

$(21, -12)$

54. Consider the triangle with vertices $A(3, 1)$, $B(-5, -3)$, and $C(-6, 7)$.

a. Show that $\triangle ABC$ is a right triangle.

$m_{\overline{AB}} = \frac{1}{2}$ $m_{\overline{BC}} = -2$

b. Find the area of $\triangle ABC$.

$2\sqrt{85}$

55. Find the slope-intercept equation of the line with the x-intercept $(18, 0)$ and y-intercept $(0, -24)$.

$y = \frac{4}{3}x - 24$

56. Find the domain of $f(x) = \frac{\sqrt{2x-3}}{x^2-5x-6}$. Express your answer using interval notation.

$$\left[\frac{3}{2}, 6\right) \cup (6, \infty)$$

57. Simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$ if $f(x) = x^2 - 3x + 5$.

$$2x + h - 3$$

58. Find the center and radius of the circle with the equation $x^2 + y^2 + 6x - 10y + 2 = 0$.

$$(-3, 5) \quad r = 4\sqrt{2}$$

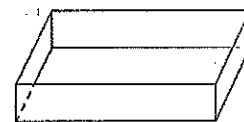
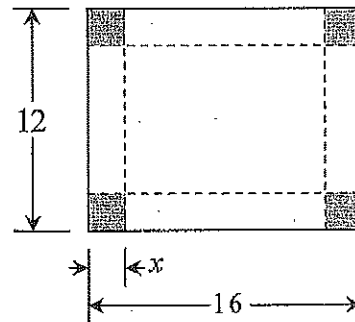
59. Find all points on the x -axis that are exactly 13 units away from $P(8, 12)$.

$$(3, 0) \quad (13, 0)$$

60. An open box is to be made by cutting squares from the corners of a 12" by 16" rectangular piece of cardboard.

Express the volume of the box as a function of x .

$$V = 4x^3 - 56x^2 + 192x$$



61. The function $h(x) = \frac{3x+5}{ax+b}$ has asymptotes $x = -2$ and $y = -1$. Find possible values of a and b .

$$a = -3 \quad b = -6$$

62. The volume of a rectangular room is $(3x^3 - 2x^2 - 11x + 10)$ cubic feet. Find the linear expressions for the length, height, and width of the room.

$$(x-1)(x+2)(3x-5)$$

63. A rational function has asymptotes $x = 7$ and $y = -\frac{1}{3}$. It also passes through the point $(-5, 0)$.

Write an equation for this rational function.

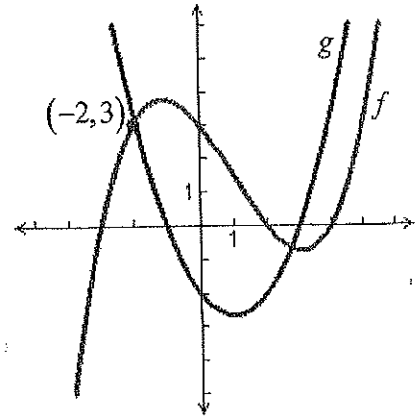
$$f(x) = \frac{-x-5}{3x-21}$$

64. The figure shows the graphs of f and g , where f is cubic and g is quadratic.

a) Write a formula for f .

b) Write a formula for g .

SKIP



65. Which of the following has no vertical asymptote?

[A] $f(x) = \frac{1}{x}$

[B] $f(x) = \frac{2x+4}{x^2+4}$

[C] $f(x) = \frac{x^2+10}{x^2-10}$

[D] $f(x) = \frac{x^4 - 10x^2 + 9}{x^3 + 8}$

[E] None of these

